Final

Site Investigation Report
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)

Fort McClellan
Calhoun County, Alabama

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK08, IT Corporation completed a site investigation (SI) at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7), at Fort McClellan in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7), consisted of the sampling and analysis of eight subsurface soil samples and three groundwater samples. In addition, one permanent groundwater monitoring well was installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. Data previously collected by QST Environmental, Inc. at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7), were incorporated into this SI report.

The analytical results indicate that metals, volatile organic compounds (VOC), and semivolatile organic compounds (SVOC) were detected in the environmental media sampled. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, analytical results were compared to human health site-specific screening levels (SSSL) and background screening values for Fort McClellan.

The potential threat to human health is expected to be low. Although the site is projected for education/training reuse, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted land reuse. In soils, the metals that exceeded residential human health SSSLs were below their respective background concentrations or within the range of background values and do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations in soils were below SSSLs.

In groundwater, three metals (aluminum, iron, and manganese) exceeded SSSLs and their respective background concentrations. However, these metals concentrations were within the range of background values. VOC and SVOC concentrations in groundwater were below SSSLs. The VOC methyl tertiary butyl ether (MTBE) was detected in two wells at concentrations of 0.005 milligrams per liter (mg/L) and 0.006 mg/L. Currently no SSSL exists for MTBE; however, the MTBE concentrations were below the U.S. Environmental Protection Agency Region 9 Preliminary Remediation Goal for MTBE in tap water (0.02 mg/L).

Based on the results of the SI, past operations at Boiler Plant No. 1 do not appear to have adversely impacted the environment. The metals and chemical compounds detected in site media do not pose an unacceptable risk to human health or the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7).

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies concerning the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE contracted IT Corporation (IT) to provide environmental services for completion of the site investigation (SI) at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7), under Contract Number DACA21-96-D-0018, Task Order CK08.

The U.S. Army Environmental Center (AEC) originally contracted QST Environmental, Inc. (QST) to conduct the SI at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7). QST prepared an SI work plan (QST, 1998) and conducted field activities in May 1998. QST proposed and collected six subsurface samples and proposed collection of three groundwater samples from existing monitoring wells. However, only two of the wells were located and sampled. Therefore, IT was tasked to install and sample one groundwater monitoring well and to collect two additional subsurface soil samples.

This SI report presents specific information and results compiled from the IT and QST fieldwork including field sampling and analysis, and monitoring well installation activities conducted at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7). The site is hereinafter referred to as Boiler Plant No. 1 and includes all associated parcels unless otherwise specified.

1.1 Project Description

Boiler Plant No. 1 was identified as an area to be investigated prior to property transfer. The site was classified as a Category 7 site in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 7 sites are areas that are not evaluated and/or that require further evaluation.

IT conducted SI field activities in accordance with the FTMC installation-wide work plan (IT, 1998) and the installation-wide sampling and analysis plan (SAP) (IT, 2000a). The SAP was

used to provide technical guidance for sample collection and analysis at Boiler Plant No. 1. The SAP includes the installation-wide safety and health plan (SHP) and quality assurance plan (QAP).

The SI included field work to collect eight subsurface soil samples (two by IT and six by QST), and three groundwater samples (one by IT and two by QST) to determine if potential site-specific chemicals are present at Boiler Plant No. 1 and to provide data useful for supporting any future corrective measures and closure activities.

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at Boiler Plant No. 1 at concentrations that present an unacceptable risk to human health or the environment. The conclusions of the SI in Chapter 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL) and background screening values for FTMC. The SSSLs were developed by IT as part of the human health risk evaluation associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000b). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

Based on the conclusions presented in this SI report, the BRAC Cleanup Team will decide either to propose "No Further Action" at the site or to conduct additional work at the site.

1.3 Site Description and History

Boiler Plant No.1, Building 3176 (Parcel 89[7]), is located in the west-central portion of the FTMC Main Post, approximately 450 feet south/southwest of the intersection of Summerall Gate Road and Exchange Avenue (formerly 21st Street) (Figures 1-1 and 1-2). Boiler Plant No. 1 was built in 1954 and operates under Alabama Department of Environmental Management (ADEM) permit number 3-01-0017-708. The plant is currently operated and maintained by Johnson Controls, Inc. and is fired by natural gas. Heating oil, which is used as a backup fuel source, is stored in two 20,000-gallon underground storage tanks (UST) located under a concrete pad just north of Building 3176 (Figure 1-2). These USTs were installed in 1991 and are constructed of fiberglass (ESE, 1998).

Parcel 26(7) consists of a UST location just east of Building 3176. Two 18,000-gallon steel USTs were closed in-place in 1991 (ESE, 1998). The 18,000-gallon USTs, which were installed in 1953, had leaked in the past (ESE, 1998).

A 500-gallon steel UST is located under a concrete pad on the west side of Building 3176 (Figure 1-2). The original UST at this location was closed in-place in 1996 and replaced with the existing UST (ESE, 1998). The existing UST is used to store diesel fuel to power a backup generator at the site.

2.0 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC properties (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with DOD guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

2. Areas where only release or disposal of petroleum products has occurred

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented

7. Areas that are not evaluated or require additional evaluation.

The EBS was conducted in accordance with the Community Environmental Response Facilitation Act (CERFA) (CERFA-Public Law 102-426) protocols and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-regulated substances, petroleum products, and Resource Conservation and Recovery Act (RCRA)-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were

conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels. Previous investigations have been conducted at Boiler Plant No. 1 as described in the following paragraphs.

In 1989, the 18,000-gallon heating oil USTs were unearthed to repair possible leaks after a tightness test indicated a potential leak. Soil samples were collected and showed low levels of total petroleum hydrocarbons (TPH) in soils near the USTs. Repairs were made and the tanks were again placed into service. In 1990, the USTs failed another tank tightness test. Therefore, the USTs were emptied to initiate temporary closure. The USTs were closed in-place in 1991 and Ecology and Environment Inc. (E&E) performed a preliminary investigation for closure of the tanks (IT, 1999). The investigation included the collection of four subsurface soil samples for total recoverable petroleum hydrocarbons (TRPH) analysis, the installation of four monitoring wells, and the collection of four groundwater samples for chemical analysis. Two of the groundwater samples were analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX), polynuclear aromatic hydrocarbons (PAH), and lead. The other two groundwater samples were analyzed for BTEX only. Two of the soil samples had TRPH concentrations above the 100 milligrams per kilogram (mg/kg) regulatory threshold. One of the groundwater samples contained lead at a concentration (0.0022 milligrams per liter [mg/L]) exceeding the ADEM maximum contaminant level of 0.002 mg/L. E&E recommended that a secondary investigation be performed; however, ADEM cleared the site and a secondary investigation was not conducted (IT, 1999).

A 550-gallon UST used to store diesel fuel was closed in-place at the site in December 1996. The closure report, prepared by Southern Environmental Management and Specialties, Inc., did not indicate that any environmental impact had occurred with the use of the tank (IT, 1999). Product odor was not noted during closure and no soil was removed. The depth to groundwater was determined to be greater than 5 feet below the bottom of the UST (IT, 1999). The 550-gallon UST was replaced with the existing 500-gallon UST.

There were not any other investigations identified for Boiler Plant No.1. The site was identified as a Category 7 CERFA site: an area that has not been evaluated or that requires additional evaluation. The site lacked adequate documentation; therefore, additional evaluation was required to determine the environmental condition of the parcel.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT and QST at Boiler Plant No. 1, including environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 Environmental Sampling

The environmental sampling performed during the SI at Boiler Plant No. 1 included the collection of subsurface soil samples and groundwater samples for chemical analysis. The sample locations were determined by observing site physical characteristics noted during a site walkover and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analyses of site-related parameters listed in Section 3.3.

3.1.1 Subsurface Soil Sampling

A total of eight subsurface soil samples were collected at Boiler Plant No. 1. IT collected two subsurface soil samples from two soil borings and QST collected six subsurface soil samples from three soil borings, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and quality assurance (QA)/quality control (QC) samples are listed in Table 3-2. Soil boring sampling locations were determined in the field by the on-site geologist based on sampling rationale, presence of surface structures, site topography, and buried and overhead utilities.

IT Sample Collection. IT contracted TEG, Inc., a direct-push technology subcontractor, to assist in subsurface soil sample collection. Subsurface soil samples were collected from soil borings at depths greater than 1-foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and soil samples collected using the direct-push sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000a). Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.3.

Soil samples were collected continuously until direct-push sampler refusal was encountered. Subsurface soil samples were field screened using a photoionization detector (PID) in accordance with Section 4.7.1.1 of the SAP (IT, 2000a) to measure for volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest sample

Table 3-1

Sampling Locations and Rationale
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
SI01-SS01	Subsurface soil	Two subsurface soil samples were collected from a soil boring located north and downslope of the approximate location of closed-in-place USTs at Parcel 26(7).
SI01-SS02	Subsurface soil	Two subsurface soil samples were collected from a soil boring located east of the approximate location of closed-in-place USTs at Parcel 26(7).
SI01-SS03	Subsurface soil	Two subsurface soil samples were collected from a soil boring located south and upgradient of the approximate location of closed-in-place USTs at Parcel 26(7).
SI01-GW01	Groundwater	A groundwater sample was collected from an existing compliance well located downgradient and north of the approximate location of closed-in-place USTs at Parcel 26(7).
SI01-GW03	Groundwater	A groundwater sample was collected from an existing compliance well located upgradient of the approximate location of the closed-in-place USTs at Parcel 26(7).
GSBP-26-GP01	Subsurface soil	A subsurface soil sample was collected from a soil boring located north and downslope of the approximate location of closed-in-place USTs at Parcel 26(7).
GSBP-26-GP02	Subsurface soil	A subsurface soil sample was collected from a soil boring located east of the approximate location of closed-in-place USTs at Parcel 26(7).
GSBP-26-MW01	Groundwater	A groundwater sample was collected from a well installed downgradient and northeast of the approximate location of closed-in-place USTs at Parcel 26(7).

Table 3-2

Soil Sample Designations and QA/QC Samples
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
GSBP-26-GP01	GSBP-26-GP01-DS-BQ0001-REG	7-8				TCL VOCs, TCL SVOCs, TAL Metals
GSBP-26-GP02	GSBP-26-GP02-DS-BQ0002-REG	10-11	GSBP-26-GP02-DS-BQ0003-FD	GSBP-26-GP02-DS-BQ0004-FS		TCL VOCs, TCL SVOCs, TAL Metals
SI01-SS01	01-SS01A	10-11				TCL VOCs, TCL SVOCs, TAL Metals
	01-SS01B	11-12				TOC
SI01-SS02	01-SS02A	11-12				TCL VOCs, TCL SVOCs, TAL Metals
	01-SS02B	15-16				TOC
SI01-SS03	01-SS03A	10-12				TCL VOCs, TCL SVOCs, TAL Metals
	01-SS03B	12-13	01-SS03B-FD			

FD - Field duplicate.
FS - Field split.
ft. bgs - feet below ground surface.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
TOC - Total organic carbon.
VOC - Volatile organic compound.

interval above the saturated zone was submitted for analyses. Samples to be analyzed for volatile organic compounds (VOC) were collected directly from the sampler with three EnCore® samplers. The remaining portion of the sample was transferred to a clean stainless-steel bowl, homogenized, and then placed in the appropriate sample containers. Samples submitted for laboratory analyses are summarized in Table 3-2. The on-site geologist at each borehole constructed a detailed lithological log. The lithological log for each borehole is included in Appendix B.

At the completion of soil sampling, boreholes were abandoned with bentonite chips and then hydrated with potable water following borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000a).

QST Sample Collection. QST contracted Graves Service Company Inc., to assist in subsurface soil sample collection. QST collected six subsurface soil samples from three soil borings at Boiler Plant No. 1. At soil boring SI01-SS01 samples were collected from 10 to 11 feet bgs and from 11 to 12 feet bgs. At boring SI01-SS02 samples were collected from 11 to 12 feet bgs and from 15 to 16 feet bgs. At boring SI01-SS03 samples were collected from 10 to 11 feet bgs and from 12 to 13 feet bgs. Subsurface soil samples were collected using a direct-push sampling system in accordance with procedures outlined in the QST work plan (QST, 1998).

3.1.2 Well Installation

IT installed one permanent monitoring well in the residuum groundwater zone at Boiler Plant No. 1 to collect groundwater samples for laboratory analyses. The well location is shown on Figure 3-1. Table 3-3 summarizes construction details of the well installed at Boiler Plant No. 1. The well construction log is included in Appendix B.

IT contracted Miller Drilling, Inc., to install the well with a hollow-stem auger rig. The well was installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000a). The borehole at this location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the first water-bearing zone in residuum at the well location. The borehole was augered to the depth of direct-push sampler refusal and samples were collected at the depth of direct-push refusal to the bottom of the borehole. A 2-foot-long, 2-inch ID carbon steel split-spoon sampler was driven at 5-foot intervals to collect residuum for observing and describing lithology. Where split-spoon refusal was encountered, the auger was advanced until the first water-bearing zone was encountered. The on-site geologist logging the auger borehole at Boiler Plant No. 1, continued the lithological log for the borehole from the depth of direct-

Table 3-3

Well Construction Summary
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Well Location	Northing	Easting	Ground Elevation (ft above msl)	TOC Elevation (ft above msl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
GSBP-26-MW01	1167893.23	668570.54	786.17	786.02	19	10	9 - 19	2" ID Sch. 40 PVC

Permanent well installed using hollow-stem auger.
Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).
2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
bgs - Below ground surface.
ft - Feet.
msl - Mean sea level.

push sampler refusal to the bottom of the auger borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeological information. The lithological log for the borehole is included in Appendix B.

Upon reaching the target depth, a 10-foot length of 2-inch ID, 0.010-inch factory slotted, continuously wrapped, Schedule 40 polyvinyl chloride (PVC) screen with a 3-inch PVC end cap was placed through the auger to the bottom of the borehole. The screen and end cap were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A sand pack consisting of number 1 filter sand (environmentally safe, clean fine sand, sieve size 20 to 40) was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The well was surged using a solid PVC surge block for approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 2 feet of bentonite chips, was placed on top of the filter sand and then hydrated with potable water. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000a). A locking well cap was placed on the PVC well casing. The well was grouted from the top of the bentonite seal to approximately 1-foot bgs with cement grout. A 3-foot by 3-foot by 4-inch surface completion well pad was installed flush to the ground surface. An 8-inch-diameter, traffic-bearing steel vault was placed around the well casing flush to the concrete surface pad.

The well was developed by surging and pumping with a 2-inch submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000a). The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well to reestablish the natural hydraulic flow conditions. Development continued until the water turbidity was equal to or less than 20 nephelometric turbidity units (NTU) or for a maximum of 4 hours. The well development log is included in Appendix C.

3.1.3 Water Level Measurements

The depth to groundwater was measured in all temporary, permanent, and existing monitoring wells installed at FTMC on March 13 and 14, 2000 following procedures outlined in Section 4.18 of the SAP (IT, 2000a). Depth to groundwater was measured with electronic water level meters. Each meter probe and cable were cleaned between use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000a). Measurements

were referenced to the top of each well casing. The groundwater level measurement for the well installed by IT at Boiler Plant No. 1 is presented in Table 3-4.

3.1.4 Groundwater Sampling

A total of three monitoring wells were sampled at Boiler Plant No. 1. IT collected a groundwater sample from one monitoring well (GSBP-26-MW01) and QST collected groundwater samples from two existing compliance monitoring wells. The well/groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and QA/QC samples are listed in Table 3-5.

IT Sample Collection. IT collected the groundwater sample following procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000a). The groundwater sample was collected after purging a minimum of three well volumes and field parameters (temperature, pH, dissolved oxygen, specific conductivity, and turbidity) stabilized. Purging and sampling were performed with a submersible pump equipped with Teflon™ tubing. Field parameters were measured using a calibrated water quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The sample was analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

QST Sample Collection. QST collected groundwater samples immediately following completion of well purging using a centrifugal pump. Groundwater sample parameters were recorded for pH, conductivity, and temperature (turbidity, dissolved oxygen, and oxidation-reduction potential were not monitored). Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.3.

3.2 Surveying of Sample Locations

IT surveyed sample locations using global positioning system (GPS) survey techniques described in Section 4.3 of the SAP (IT, 2000a), and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000a). Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

QST surveyed sample locations using GPS survey techniques or traditional surveying techniques described in the QST work plan (QST, 1998). Map coordinates for each sample location were

Table 3-4

Groundwater Elevations
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft above msl)	Ground Elevation (ft above msl)	Groundwater Elevation (ft above msl)
GSBP-26-MW01	14-Mar-00	0.65	786.02	786.17	785.37

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

BTOC - Below top of casing.
ft - Feet.
msl - mean sea level.

Table 3-5

Groundwater Sample Designations and QA/QC Samples
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples			Analytical Suite
		Field Duplicates	Field Splits	MS/MSD	
GSBP-26-MW01	GSBP-26-MW01-GW-BQ-3001-REG	GSBP-26-MW01-GW-BQ3002-FD	GSBP-26-MW01-GW-BQ3003-FS		TCL VOCs, TCL SVOCs, TAL Metals
SI01-GW01	01-GW01				TCL VOCs, TCL SVOCs, TAL Metals
SI01-GW03	01-GW03				TCL VOCs, TCL SVOCs, TAL Metals

Ground water samples were collected from the approximate midpoint of the saturated screened interval of the monitoring well.

FD - Field duplicate.
FS - Field split.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

Table 3-6

Groundwater Field Parameters
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Specific Conductivity (mS/cm)[a]	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
GSBP-26-MW01	28-Oct-99	0.472	2.44	NR	22.9	1	7.23
SI01-GW01	20-May-98	0.190	NR	NR	24.8	NR	6.90
SI01-GW03	20-May-98	0.150	NR	NR	20.9	NR	6.70

[a] Specific conductivity values standardized to millisiemens per centimeter.

°C - Degrees Celsius.
mg/L - Milligrams per liter.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NR - Not recorded.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
SU - Standard units.

determined using a Transverse Mercator or State Planar grid to within ± 3 feet (± 1 meter). Horizontal coordinates are included in Appendix D.

3.3 Analytical Program

IT and QST samples collected during the SI were analyzed for various physical and chemical parameters. The specific suite of analyses performed was based on the potential site-specific chemicals historically at the site and EPA, ADEM, FTMC, and USACE requirements. Samples collected at Boiler Plant No. 1 were analyzed for the following parameters:

- Target compound list VOCs – EPA Method 5035/8260B
- Target compound list semivolatile organic compounds (SVOC) – EPA Method 8270C
- Target analyte list metals - EPA Method 6010B/7000
- Total organic carbon (TOC) - EPA Method 9060 (two soil samples only).

The samples were analyzed using EPA SW-846 methods, including Update III Methods where applicable.

3.4 Sample Preservation, Packaging, and Shipping

IT collected samples following requirements specified in Section 4.13.2 of the SAP (IT, 2000a), for preservation, packaging, and shipping. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Chapter 5.0, Table 5-1, of Appendix B of the SAP (IT, 2000a). Sample documentation and chain-of-custody records were recorded as specified in Section 4.13 of the SAP (IT, 2000a).

Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to Quanterra Environmental Services in Knoxville, Tennessee. Split samples were shipped to the USACE South Atlantic Division Laboratory in Marietta, Georgia.

QST preserved, packaged, and shipped samples following guidelines specified in the QST work plan (QST, 1998).

3.5 Investigation-Derived Waste Management and Disposal

IT Investigation-Derived Waste. IT investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000a). The IDW generated during the SI at Boiler Plant No. 1 was segregated as follows:

- Drill cuttings
- Purge water from well development and sampling activities, and decontamination fluids
- Personal protective equipment.

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure (TCLP) analyses. Based on the results, drill cuttings and personal protective equipment generated during the SI at Boiler Plant No. 1 were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the existing 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

QST Investigation-Derived Waste. QST-generated IDW was managed and disposed as outlined in the QST work plan (QST, 1998).

3.6 Variances/Nonconformances

There were not any variances or nonconformances to the site-specific field sampling plan (SFSP) recorded by IT during completion of the SI at Boiler Plant No. 1. QST did not document any variances or nonconformances to the QST work plan (QST, 1998).

3.7 Data Quality

IT Data. Samples collected by IT were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and QAP; and standard, accepted methods and procedures. Sample collection logs pertaining to the collection of these samples

were reviewed and organized for this report and are included in Appendix A. The field sample analytical data are presented in tabular form in Appendix E.

Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000a]). Chemical data were reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms. A summary of validated data is included in Appendix E. A complete (100 percent) Level III data validation effort was performed on the reported analytical data. Appendix F includes a data validation summary report that discusses the results of the IT data validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System™ (ITEMS) database for tracking and reporting.

QST Data. QST data were submitted to the Installation Restoration Data Management Information System (IRDMIS) database at the conclusion of QST field activities. Hard-copy data packages were sent to the AEC in Edgewood, Maryland for storage. IT retrieved the electronic data via IRDMIS and the original data packages from the AEC for evaluation. From the IRDMIS data, IT was able to identify the key fields of information (analytical records, geotechnical information, sample location information, and water level readings) and translate the data into the ITEMS database.

QST hard-copy analytical data packages were validated during a complete (i.e., 100 percent) Level III data validation effort. Appendix F includes a copy of the data validation summary report that discusses the QST data validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. In addition, during the validation the electronic results were compared to the hard-copy report. Concentrations in the database were corrected where necessary and validation qualifiers added to the QST data using ITEMS to reflect the findings summarized in the QST data validation report.

After the QST data validation was complete and the results were updated, the QST data and the IT data were merged using ITEMS for inclusion in this SI report. The combined validated analytical data are presented in tabular form in Appendix E. The validated data were used in the

comparison to the SSSLs developed by IT. Rejected data (assigned an "R" qualifier) were not used in the comparison to the SSSLs. The IT and QST data presented in this report, except where qualified, meet the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at Boiler Plant No. 1 provided soil, geologic, and hydrogeologic data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and it is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold and thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted with major structures and faults striking in a northeast-southwest direction.

Northwestward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992), and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated, greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of

siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appear to dominate the unit and consists primarily of coarse-grained, vitreous quartzite, and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consists of sandy and micaceous shale and silty, micaceous mudstone which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east and southwest of the Main Post and consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southeast of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984), and immediately to the west of Reilly Airfield (Osborne and Szabo, 1984). The Rome Formation consists of variegated thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962), (Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium-bedded to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded

to laminated, siliceous dolomite and dolomitic limestone that weathers to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite. The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites and limestones, and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish-gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Szabo et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of Fort McClellan, to the Ordovician Athens Shale on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City Fault (Osborne and Szabo, 1984). The Ordovician sequence comprising the Eden thrust sheet is exposed at FTMC through an eroded "window" or "fenster" in the overlying thrust sheet. Rocks within the window display complex folding with the folds being overturned, and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, north by the Conasauga Formation, northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997).

4.1.2 Site Geology

Soils at Boiler Plant No. 1 fall into the Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded (AcB2). This mapping unit consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. The color of the surface soil ranges from very dark brown and dark brown to reddish brown and dark reddish brown. The texture of subsoil ranges from light clay loam to clay or silty clay loam. The alluvium ranges in thickness from 2 feet to more than 8 feet. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Organic matter is moderately low (U.S. Department of Agriculture, 1961).

Boiler Plant No. 1 is situated near the southwestern boundary of the Ordovician window in the uppermost thrust sheet. Bedrock beneath the site is mapped as Ordovician Little Oak and Newala limestones undifferentiated, as shown on Figure 4-1.

Based on direct-push and hollow-stem auger boring data collected during the SI, residuum beneath the site consists of predominantly silt and clay overlying weathered shale and shale. Direct-push refusal was encountered at depths ranging from 8 to 11 feet bgs. Competent bedrock was not encountered during drilling.

Based on the observation of weathered shale encountered during drilling at the site indicates that bedrock beneath the site is Mississippian/Ordovician Floyd and Athens shale undifferentiated.

The contact between the Floyd and Athens shale and the Little Oak and Newala limestones probably occurs north of where it is indicated on Figure 4-1.

4.2 Site Hydrology

4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 54 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates. The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Surface runoff at Boiler Plant No. 1 follows the general topography and flows north/northwest toward Remount Creek.

4.2.2 Hydrogeology

The static groundwater level was measured in the permanent well installed at the site on March 14, 2000, as summarized in Table 3-4. Groundwater flow at the site probably follows the general topography and flows to the north/northwest.

During soil boring and well installation activities, groundwater was encountered in weathered shale at a depth of approximately 15 feet bgs. The static groundwater level summarized in Table 3-4 is approximately 14 feet above the depth to water data from the boring log (Appendix B). This indicates that the groundwater has an upward hydraulic head and is under semiconfined conditions.

5.0 Summary of Analytical Results

The results of the chemical analyses of samples collected at Boiler Plant No. 1 indicate that metals, VOCs, and SVOCs were detected in site media. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, the analytical results were compared to the human health SSSLs for FTMC. The SSSLs were developed by IT for human health risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metal concentrations exceeding the SSSLs were subsequently compared to metals background screening values (background concentrations) (SAIC, 1998) to determine if the metals concentrations are within natural background concentrations. Summary statistics for background metals samples collected at FTMC (SAIC, 1998) are included in Appendix G.

Six compounds were quantified by both SW-846 Method 8260B (as VOC) and Method 8270C (as SVOC), including 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 1,3-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, and naphthalene. Method 8260B yields an reporting limit (RL) of 0.005 milligrams per kilogram (mg/kg), while Method 8270C has an RL of 0.330 mg/kg, which is typical for a soil matrix sample. Because of the direct nature of the Method 8260B analysis and its resulting lower RL, this method should be considered superior to Method 8270C when quantifying low levels (0.005 to 0.330 mg/kg) of these compounds. However, method 8270C and its associated methylene chloride extraction step is superior, when dealing with samples that contain higher concentrations (greater than 0.330 mg/kg) of these compounds. Therefore, all data were considered and none were categorically excluded. Data validation qualifiers were helpful in evaluating the usability of data, especially if calibration, blank contamination, precision, or accuracy indicator anomalies were encountered. The validation qualifiers and concentrations reported (e.g., whether concentrations were less than or greater than 0.330 mg/kg) were used to determine which analytical method was likely to return the more accurate result.

The following sections, as well as Tables 5-1 and 5-2, summarize the results of the comparison of detected constituents to the SSSLs, and background screening values. Complete analytical results are presented in Appendix E.

Table 5-1

Subsurface Soil Analytical Results
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Parcel				GSBP-26				GSBP-26				GSBP-26				GSBP-26			
Sample Location				GSBP-26-GP01				GSBP-26-GP02				SI01-SS01				SI01-SS01			
Sample Number				BQ0001				BQ0002				01-SS01A				01-SS01B			
Sample Date				2-Nov-99				2-Nov-99				7-May-98				7-May-98			
Sample Depth (Feet)				7-8				10-11				10-12				11-13			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.44E+04		YES	YES	1.58E+04		YES	YES	9.70E+03			YES	9.82E+03			YES
Antimony	mg/kg	1.31E+00	3.11E+00	7.50E-01	J			ND				1.30E+00	B			8.82E-01			
Arsenic	mg/kg	1.83E+01	4.26E-01	6.90E+00	J		YES	4.90E+00	J		YES	4.92E+00			YES	6.96E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.47E+01				4.70E+01				4.63E+01				3.35E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	6.40E-01	J			8.90E-01	J	YES		4.19E-01				3.35E-01			
Cadmium	mg/kg	2.20E-01	6.25E+00	ND				1.20E-01	J			3.31E-01		YES		7.14E-01		YES	
Calcium	mg/kg	6.37E+02	NA	7.22E+02		YES		7.83E+02		YES		3.86E+02				4.35E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	2.06E+01				2.10E+01				1.54E+01				1.45E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	6.80E+00				2.31E+01	J	YES		1.19E+00				2.79E+00			
Copper	mg/kg	1.94E+01	3.13E+02	4.60E+01		YES		4.20E+01		YES		4.41E+01		YES		7.81E+01		YES	
Iron	mg/kg	4.48E+04	2.34E+03	3.32E+04			YES	3.23E+04			YES	2.87E+04			YES	2.46E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	1.98E+01				2.22E+01				1.65E+01				2.01E+01			
Magnesium	mg/kg	7.66E+02	NA	5.73E+03		YES		8.21E+03		YES		3.53E+03		YES		3.13E+03		YES	
Manganese	mg/kg	1.36E+03	3.63E+02	9.19E+01				2.08E+02				2.87E+01	J			3.79E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	5.70E-02				4.90E-02	B			3.42E-02				4.58E-02			
Nickel	mg/kg	1.29E+01	1.54E+02	3.44E+01		YES		4.77E+01		YES		8.38E+00				1.02E+01			
Potassium	mg/kg	7.11E+02	NA	7.21E+02		YES		8.73E+02		YES		4.85E+02				4.91E+02			
Selenium	mg/kg	4.70E-01	3.91E+01	ND				7.50E-01	J	YES		1.22E+00		YES		2.64E+00		YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				3.09E-01		YES		7.14E-01		YES	
Sodium	mg/kg	7.02E+02	NA	1.24E+02	J			1.33E+02	J			1.00E+02	B			2.34E+02			
Thallium	mg/kg	1.40E+00	5.08E-01	1.40E+00		YES	YES	5.10E-01	J		YES	ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	2.49E+01				2.24E+01				3.09E+01				2.57E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.21E+02		YES		1.19E+02		YES		5.51E+01		YES		6.70E+01		YES	
VOLATILE ORGANIC COMPOUNDS																			
1,1,1-Trichloroethane	mg/kg	NA	1.55E+03	ND				ND				ND				7.90E-03			
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	ND				4.70E-03	J			ND				ND			
1,3,5-Trimethylbenzene	mg/kg	NA	3.88E+02	ND				1.10E-03	J			ND				ND			
1,3-Dichlorobenzene	mg/kg	NA	6.99E+00	ND				7.10E-03	J			ND				ND			
1,4-Dichlorobenzene	mg/kg	NA	2.62E+01	ND				6.50E-03	J			ND				ND			
2-Butanone	mg/kg	NA	4.66E+03	ND				5.00E-03	J			ND				ND			
Acetone	mg/kg	NA	7.76E+02	ND				3.80E-02	J			ND				ND			
Benzene	mg/kg	NA	2.17E+01	ND				ND				ND				ND			
Bromobenzene	mg/kg	NA	1.55E+02	ND				5.20E-03	J			ND				ND			
Bromomethane	mg/kg	NA	1.09E+01	ND				5.50E-03	J			ND				ND			
Carbon disulfide	mg/kg	NA	7.77E+02	ND				ND				ND				ND			
Ethylbenzene	mg/kg	NA	7.77E+02	ND				ND				2.30E-03	J			5.40E-03			
Methylene chloride	mg/kg	NA	8.41E+01	3.90E-03	B			1.60E-02	B			2.90E-03	J			2.70E-03	J		
Tetrachloroethene	mg/kg	NA	1.21E+01	ND				ND				ND				ND			
Toluene	mg/kg	NA	1.55E+03	ND				ND				8.40E-04	J			2.50E-03	J		
Trichloroethene	mg/kg	NA	5.72E+01	ND				ND				ND				4.00E-03	J		
Xylene, Total	mg/kg	NA	1.55E+04	NA				ND				1.10E-02				2.80E-02			
m,p-Xylenes	mg/kg	NA	1.55E+04	ND				1.60E-03	J			ND				ND			
o-Chlorotoluene	mg/kg	NA	1.55E+02	ND				2.90E-03	J			ND				ND			
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	NA	2.33E+03	ND				ND				ND				ND			
Diethyl phthalate	mg/kg	NA	6.23E+03	ND				ND				1.10E+00				ND			
Fluoranthene	mg/kg	NA	3.09E+02	ND				ND				ND				ND			
Phenanthrene	mg/kg	NA	2.32E+03	ND				ND				ND				ND			
Pyrene	mg/kg	NA	2.33E+02	ND				ND				ND				ND			

Table 5-1

Subsurface Soil Analytical Results
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Parcel				GSBP-26				GSBP-26				GSBP-26				GSBP-26			
Sample Location				SI01-SS02				SI01-SS02				SI01-SS03				SI01-SS03			
Sample Number				01-SS02A				01-SS02B				01-SS03A				01-SS03B			
Sample Date				7-May-98				7-May-98				7-May-98				7-May-98			
Sample Depth (Feet)				11-13				15 - 17				10-12				12-14			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.03E+04			YES	9.59E+03			YES	3.59E+03				5.01E+03	J		
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	3.52E+00			YES	3.32E+00			YES	2.66E+00			YES	1.74E+00	J		YES
Barium	mg/kg	2.34E+02	5.47E+02	3.74E+01				1.28E+01				1.14E+01				1.25E+02			
Beryllium	mg/kg	8.60E-01	9.60E+00	6.49E-01				5.33E-01				3.08E-01				3.99E-01	J		
Cadmium	mg/kg	2.20E-01	6.25E+00	2.20E-01		YES		2.45E-01		YES		ND				8.20E-02	J		
Calcium	mg/kg	6.37E+02	NA	5.39E+02				7.78E+02		YES		8.34E+02		YES		1.25E+03		YES	
Chromium	mg/kg	3.83E+01	2.32E+01	1.54E+01				1.28E+01				7.70E+00				7.06E+00	J		
Cobalt	mg/kg	1.75E+01	4.68E+02	7.48E+00				9.38E+00				5.78E-01				5.24E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	3.19E+01		YES		2.67E+01		YES		1.67E+01				1.48E+01	J		
Iron	mg/kg	4.48E+04	2.34E+03	2.31E+04			YES	2.03E+04			YES	1.54E+04			YES	1.05E+04	J		YES
Lead	mg/kg	3.85E+01	4.00E+02	1.21E+01				1.28E+01				8.99E+00				7.74E+00	J		
Magnesium	mg/kg	7.66E+02	NA	4.95E+03		YES		6.50E+03		YES		1.93E+02				1.94E+03	J	YES	
Manganese	mg/kg	1.36E+03	3.63E+02	7.70E+01				5.22E+01				3.59E+01				5.47E+01	J		
Mercury	mg/kg	7.00E-02	2.33E+00	4.84E-02				3.20E-02				5.39E-02				2.80E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	2.09E+01		YES		3.20E+01		YES		2.57E+00				1.59E+01	J	YES	
Potassium	mg/kg	7.11E+02	NA	4.29E+02				3.41E+02				1.54E+02				2.16E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	5.74E-01		YES		8.27E-01		YES		3.63E-01	B			3.38E-01	B		
Silver	mg/kg	2.40E-01	3.91E+01	ND				1.17E-01				ND				ND			
Sodium	mg/kg	7.02E+02	NA	1.98E+02				1.92E+02				2.82E+02				2.39E+02	J		
Thallium	mg/kg	1.40E+00	5.08E-01	2.53E-01	B			3.30E-01	B			ND				ND			
Vanadium	mg/kg	6.49E+01	5.31E+01	1.43E+01				1.17E+01				1.41E+01				8.54E+00	J		
Zinc	mg/kg	3.49E+01	2.34E+03	7.15E+01		YES		6.08E+01		YES		1.04E+01				4.67E+01	J	YES	
VOLATILE ORGANIC COMPOUNDS																			
1,1,1-Trichloroethane	mg/kg	NA	1.55E+03	6.90E-03				1.40E-02	J			ND				8.20E-03			
1,2,4-Trimethylbenzene	mg/kg	NA	3.88E+02	ND				ND				ND				ND			
1,3,5-Trimethylbenzene	mg/kg	NA	3.88E+02	ND				ND				ND				ND			
1,3-Dichlorobenzene	mg/kg	NA	6.99E+00	ND				ND				ND				ND			
1,4-Dichlorobenzene	mg/kg	NA	2.62E+01	ND				ND				ND				ND			
2-Butanone	mg/kg	NA	4.66E+03	ND				ND				ND				ND			
Acetone	mg/kg	NA	7.76E+02	ND				2.80E-02	J			4.40E-02				2.70E-02	J		
Benzene	mg/kg	NA	2.17E+01	6.10E-04	J			ND				7.40E-04	J			8.20E-04	J		
Bromobenzene	mg/kg	NA	1.55E+02	ND				ND				ND				ND			
Bromomethane	mg/kg	NA	1.09E+01	ND				ND				ND				ND			
Carbon disulfide	mg/kg	NA	7.77E+02	ND				1.00E-03	J			ND				8.60E-04	J		
Ethylbenzene	mg/kg	NA	7.77E+02	5.80E-03				1.40E-02	J			2.40E-03	J			7.80E-03			
Methylene chloride	mg/kg	NA	8.41E+01	3.40E-03	J			3.60E-03	J			2.10E-03	J			2.60E-03	J		
Tetrachloroethene	mg/kg	NA	1.21E+01	2.40E-02				6.70E-02	J			ND				3.80E-02			
Toluene	mg/kg	NA	1.55E+03	3.00E-03	J			4.20E-03	J			1.40E-03	J			2.80E-03	J		
Trichloroethene	mg/kg	NA	5.72E+01	4.20E-03	J			ND				ND				5.50E-03			
Xylene, Total	mg/kg	NA	1.55E+04	3.00E-02				7.30E-02				1.20E-02				4.30E-02			
m,p-Xylenes	mg/kg	NA	1.55E+04	ND				ND				ND				ND			
o-Chlorotoluene	mg/kg	NA	1.55E+02	ND				ND				ND				ND			
SEMIVOLATILE ORGANIC COMPOUNDS																			
Anthracene	mg/kg	NA	2.33E+03	ND				ND				1.54E-01				ND			
Diethyl phthalate	mg/kg	NA	6.23E+03	ND				ND				ND				ND			
Fluoranthene	mg/kg	NA	3.09E+02	ND				ND				4.36E-01				ND			
Phenanthrene	mg/kg	NA	2.32E+03	ND				ND				1.54E-01				ND			
Pyrene	mg/kg	NA	2.33E+02	ND				ND				3.21E-01				ND			

Table 5-1

Subsurface Soil Analytical Results
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).
J - Result is greater than method detection limit but less than or equal to reporting limit.
mg/kg - Milligrams per kilogram.
NA - Not available.
ND - Not detected.
NR - Analysis not requested.
Qual - Data validation qualifier.

Table 5-2

Groundwater Analytical Results
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Parcel				GSBP-26				GSBP-26				GSBP-26			
Sample Location				GSBP-26-MW01				SI01-GW01				SI01-GW03			
Sample Number				BQ3001				01-GW01				01-GW03			
Sample Date				13-Dec-99				20-May-98				20-May-98			
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**	**Result**	**Qual**	**>BKG**	**>SSSL**
METALS															
Aluminum	mg/L	2.34E+00	1.56E+00	9.71E-02	B			6.05E-01				4.37E+00		YES	YES
Arsenic	mg/L	1.78E-02	4.00E-05	ND				ND				1.13E-02			YES
Barium	mg/L	1.27E-01	1.10E-01	9.18E-02	J			3.72E-02				1.23E-01			YES
Cadmium	mg/L	2.51E-03	7.80E-04	ND				9.11E-04			YES	ND			
Calcium	mg/L	5.65E+01	NA	4.37E+01				7.36E+01	J	YES		2.35E+01	J		
Chromium	mg/L	NA	4.69E-03	ND				ND				6.39E-03			YES
Cobalt	mg/L	2.34E-02	9.39E-02	ND				1.55E-03				1.14E-02			
Copper	mg/L	2.55E-02	6.26E-02	ND				2.59E-03				1.02E-02			
Iron	mg/L	7.04E+00	4.69E-01	3.30E-01				1.67E+00			YES	2.39E+01		YES	YES
Lead	mg/L	7.99E-03	1.50E-02	ND				ND				6.86E-03			
Magnesium	mg/L	2.13E+01	NA	1.38E+01				1.43E+01				2.29E+01		YES	
Manganese	mg/L	5.81E-01	7.35E-02	1.66E-01			YES	5.89E-01		YES	YES	9.95E-01		YES	YES
Nickel	mg/L	NA	3.13E-02	ND				ND				2.25E-02			
Potassium	mg/L	7.20E+00	NA	2.97E+00	J			2.14E+00				2.02E+00			
Sodium	mg/L	1.48E+01	NA	3.15E+01		YES		2.28E+01		YES		1.25E+01			
Vanadium	mg/L	1.70E-02	1.10E-02	ND				1.73E-03				1.12E-02			YES
Zinc	mg/L	2.20E-01	4.69E-01	ND				1.26E-02	J			3.52E-02	J		
VOLATILE ORGANIC COMPOUNDS															
Acetone	mg/L	NA	1.56E-01	ND				5.00E-03	B			6.20E-03	B		
Chloromethane	mg/L	NA	3.92E-03	1.10E-04	B			ND				ND			
Methyl tert-Butyl Ether[c]	mg/L	NA	NA	ND				5.00E-03				6.00E-03			
Methylene chloride	mg/L	NA	7.85E-03	ND				2.40E-03	B			2.60E-03	B		
SEMIVOLATILE ORGANIC COMPOUNDS															
Di-n-butyl phthalate	mg/L	NA	1.48E-01	ND				2.00E-04	J			ND			
bis(2-Ethylhexyl)phthalate	mg/L	NA	4.30E-03	ND				1.80E-03	B			1.50E-03	B		

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods, including Update III methods where applicable.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.

[c] Methyl tertiary butyl ether is a tentatively identified compound and is not part of the target compound list. The concentration is estimated.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Result is greater than method detection limit but less than or equal to reporting limit.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

5.1 Subsurface Soil Analytical Results

Eight subsurface soil samples were collected for chemical analyses at Boiler Plant No. 1. Subsurface soil samples were collected at depths greater than 1-foot bgs at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-1.

Metals. Twenty-three metals were detected in subsurface soil samples collected at Boiler Plant No. 1. One of the antimony results, one of the mercury results, two of the selenium results, one of the sodium results and two of the thallium results were flagged with a "B" data qualifier signifying that these metals were also detected in an associated laboratory or field blank sample.

The concentrations of four metals (aluminum, arsenic, iron, and thallium) exceeded residential human health SSSLs. With the exception of aluminum at two locations (GSBP-26-GP01 and GSBP-26-GP02) and thallium at GSBP-26-GP01, the concentrations of these metals were below their respective background concentrations. The aluminum and thallium results at these locations were within the range of background values (Appendix G).

Volatile Organic Compounds. Nineteen VOCs were detected in subsurface soil samples collected at Boiler Plant No. 1. Two of the methylene chloride results were flagged with a "B" data qualifier, signifying that this compound was also detected in an associated laboratory or field blank sample.

The VOC concentrations in subsurface soils were below SSSLs.

Semivolatile Organic Compounds. A total of five SVOCs were detected in two of the subsurface soil samples collected at the site. SVOCs were not detected in six samples and diethyl phthalate was the only SVOC detected in sample 01-SS01A. Sample number 01-SS03A contained four of the five detected SVOCs.

The SVOC concentrations in subsurface soils were below SSSLs.

Total Organic Carbon. Two of the six subsurface soil samples collected by QST (01-SS01B and 01-SS02B) were analyzed for TOC content. TOC concentrations in the samples were 4,490 mg/kg and 5,490 mg/kg, as summarized in Appendix E.

5.2 Groundwater Analytical Results

Three permanent monitoring wells were sampled at Boiler Plant No. 1 at the locations shown on Figure 3-1. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-3.

Metals. Seventeen metals, including aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc, were detected in groundwater samples collected at Boiler Plant No. 1.

The concentrations of eight metals (aluminum, arsenic, barium, cadmium, chromium, vanadium, iron, and manganese) exceeded residential human health SSSLs. Of these metals, aluminum (one sample), iron (one sample), and manganese (two samples) concentrations also exceeded their respective background concentrations (note: a background value for chromium was not available). However, the aluminum, iron, and manganese concentrations were within the range of background values (Appendix G).

Volatile Organic Compounds. Four VOCs, including acetone, chloromethane, methyl tertiary butyl ether (MTBE), and methylene chloride, were detected in groundwater samples collected at Boiler Plant No. 1. The acetone, chloromethane, and methylene chloride results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample.

The VOC concentrations in groundwater were below SSSLs. MTBE was detected in SI01-GW01 and SI01-GW03 at concentrations of 0.005 and 0.006 mg/L, respectively. Currently no SSSL exists for MTBE; however, the MTBE concentrations were below the EPA Region 9 Preliminary Remediation Goal for MTBE in tap water (0.02 mg/L) (EPA, 2000).

Semivolatile Organic Compounds. Two SVOCs (bis[2-ethylhexyl]phthalate and di-n-butyl phthalate) were detected in groundwater samples collected at Boiler Plant No. 1. The bis(2-ethylhexyl)phthalate results were flagged with a "B" data qualifier signifying that this compound was also detected in an associated laboratory or field blank sample.

The SVOC concentrations in groundwater were below SSSLs.

6.0 Summary, Conclusions, and Recommendations

IT, under contract with the USACE, completed an SI at Boiler Plant No. 1 at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site at concentrations that present an unacceptable risk to human health or the environment. The SI at Boiler Plant No. 1 consisted of the sampling and analyses of subsurface soil samples and groundwater samples. In addition, one permanent groundwater monitoring well was installed in the residuum groundwater zone to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. Data previously collected by QST at Boiler Plant No. 1 were incorporated into this SI report.

The analytical results indicate that metals, VOCs, and SVOCs were detected in the environmental media sampled. Analytical results were compared to human health SSSLs. The SSSLs were developed by IT for human health risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metals results exceeding the SSSLs were compared to media-specific background concentrations (SAIC, 1998).

The potential threat to human health is expected to be low. Although the site is projected for education/training reuse, the analytical data were screened against residential human health SSSLs to evaluate the site for possible unrestricted land reuse. In soils, the metals that exceeded residential human health SSSLs were below their respective background concentrations or within the range of background values and do not pose an unacceptable risk to future human receptors. VOC and SVOC concentrations in soils were below SSSLs.

In groundwater, three metals (aluminum, iron, and manganese) exceeded SSSLs and their respective background concentrations. However, these metals concentrations were within the range of background values. VOC and SVOC concentrations in groundwater were below SSSLs. The VOC MTBE was detected in two wells (SI01-GW01 and SI01-GW03) at concentrations of 0.005 mg/L and 0.006 mg/L, respectively. Currently no SSSL exists for MTBE. However, the MTBE concentrations were below the EPA Region 9 Preliminary Remediation Goal for MTBE in tap water (0.02 mg/L) (EPA, 2000).

Based on the results of the SI, past operations at Boiler Plant No. 1 do not appear to have adversely impacted the environment. The metals and chemical compounds detected in site media

do not pose an unacceptable risk to human health or the environment. Therefore, IT recommends "No Further Action" and unrestricted land reuse at Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7).

7.0 References

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	silvex
3D	3D International Environmental Group
Abs	skin absorption
AC	hydrogen cyanide
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ADEM	Alabama Department of Environmental Management
AEL	airborne exposure limit
AHA	ammunition holding area
AL	Alabama
amb.	amber
ANAD	Anniston Army Depot
APT	armor-piercing tracer
ARAR	applicable or relevant and appropriate requirement
ASP	ammunition supply point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AWWSB	Anniston Water Works and Sewer Board
‘B’	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCT	BRAC Cleanup Team
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BG	Bacillus globigii
bgs	below ground surface
BHC	betahexachlorocyclohexane
bkg	background
bls	below land surface
BOD	biological oxygen demand
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BW	biological warfare
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CG	carbonyl chloride (phosgene)
CFC	chlorofluorocarbon
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl.	chlorinated
CLP	Contract Laboratory Program
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
Co-60	cobalt-60
COC	chain of custody; contaminant of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	contaminant of potential concern
COPEC	contaminant of potential environmental concern
CRL	certified reporting limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
D	duplicate; dilution
DANC	decontamination agent, non-corrosive
ºC	degrees Celsius
ºF	degrees Fahrenheit
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEP	depositional soil
DI	deionized
DIMP	di-isopropylmethylphosphonate
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DOT	Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
ER	equipment rinsate
ESE	Environmental Science and Engineering, Inc.
ESV	ecological screening value
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FD	field duplicate
FedEx	Federal Express, Inc.
FFE	field flame expedient
Fil	filtered
Flt	filtered
FMP 1300	Former Motor Pool 1300
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
g	gram
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System

gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
Herb.	herbicides
HNO_3	nitric acid
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
'I'	out of control, data rejected due to low recovery
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative derived media
IDW	investigation-derived waste
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IRDMIS	Installation Restoration Data Management Information System
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System ™
'J'	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
K	conductivity
L	lewisite; liter
LC_{50}	lethal concentration for 50 percent of population tested
LD_{50}	lethal dose for 50 percent of population tested
l	liter
LCS	laboratory control sample
LEL	lower explosive limit
LOAEL	lowest-observed-adverse-effects-level
LT	less than the certified reporting limit
max	maximum
MCL	maximum contaminant level
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air sampling system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MOGAS	motor vehicle gasoline
MPA	methyl phosphonic acid
MR	molasses residue
MS	matrix spike
mS/cm	millisiemens per centimeter
MSD	matrix spike duplicate
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
N/A	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NCP	National Contingency Plan
ND	not detected
NE	no evidence; northeast
NFA	No Further Action
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded
ns	nanosecond
N-S	north to south
NS	not surveyed
nT	nanotesla
NTU	nephelometric turbidity unit
O&G	oil and grease
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OWS	oil/water separator
oz	ounce
PAH	polynuclear aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEL	permissible exposure limit
Pest.	pesticide
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
POL	petroleum, oils, and lubricants
PP	peristaltic pump
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PRG	preliminary remediation goals
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental Inc.

qty	quantity
Qual	qualifier
'R'	rejected; resample
RAO	removal action objective
RBC	EPA Region III Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RDX	cyclonite
ReB3	Rarden silty clay loams
REG	field sample
REL	recommended exposure limit
RFA	request for analysis
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTK	real-time kinematic
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	schedule
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
SL	standing liquid
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	sump pump
Sr-90	strontium-90
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSSL	site-specific screening level
STB	supertropical bleach
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TWA	time weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

- LT – Less than the certified reporting limit

Flagging Codes

- 9 – Non-demonstrated/validated method performed for USAEC
- B – Analyte found in the method blank or QC blank
- C – Analysis was confirmed
- D – Duplicate analysis
- I – Interfaces in sample make quantitation and/or identification to be suspicious
- J – Value is estimated
- K – Reported results are affected by interfaces or high background
- N – Tentatively identified compound (match greater than 70%)
- Q – Sample interference obscured peak of interest
- R – Non-target compound analyzed for but not detected (GC/MS methods)
- S – Non-target compound analyzed for and detected (GC/MS methods)
- T – Non-target compound analyzed for but not detected (non GC/MS methods)
- U – Analysis in unconfirmed
- Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

- J – The low-spike recovery is low
- N – The high-spike recovery is low
- R – Data is rejected

APPENDIX D

SURVEY DATA

Appendix D

Survey Data
Boiler Plant No. 1, Building 3176, Parcels 26(7) and 89(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Northing	Easting	Ground Elevation (ft above msl)	Top of Casing Elevation (ft above msl)
GSBP-26-GP01	1167897.95	668543.09	786.04	NA
GSBP-26-GP02	1167872.63	668576.42	786.40	NA
GSBP-26-MW01	1167893.23	668570.54	786.17	786.02
SI01-GW01	1167899.50	668554.19	NS	NS
SI01-GW03	1167836.13	668572.13	NS	NS
SI01-SS01	1167895.38	668555.13	NS	NA
SI01-SS02	1167873.75	668586.69	NS	NA
SI01-SS03	1167839.38	668570.94	NS	NA

Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

ft above msl - Feet above mean sea level.
NA - Not applicable.
NS - Not surveyed.